Specifications & Set-up

READ THIS DOCUMENT THOROUGHLY BEFORE ATTEMPTING TO ASSEMBLE OR OPERATE

THE

Black Opal

Multi Function Flat Panel Display System
Model RMU10HX

Treatment of this product other than as specified herein may result in:

damage to the product or attached systems;

invalidation of the warranty.

The location of this document should always be known to all users of, and technical support personnel for, the Black Opal RMU.

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Note: specifications herein are subject to change without notice.

CAUTIONS:

- **User-supplied cables must be correctly wired (see Connector/Pin Details).**
- **Ensure that external power is within the range specified.**
- **Ensure that external power is off before proceeding with set-up.**

Tracking Records	
This document is appropriate for the following product configurations:	
Model:	Black Opal Model: RMU10HX.
Initial Installed Software Version:	4.5

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1 SYSTEM SPECIFICATIONS

1.1 System Performance

PARAMETER		SPECIFICATION
Designation		
RMU10HX		Remote Monitor Unit, 10", High brightness, XGA
Control		
Control Functions [factory configurable to customer requirements]		power On/Off; backlight intensity; menu select; select screen lay-out; select image enhancement feature; digital zoom; freeze frame
Controls		tactile 8-button membrane
Display		
Type		Active Matrix Colour (18-bit colour) LCD Module
Display Size ([2] {cm})	**diagonal**	10.4 {26.42}
	active area	8.31 {21.1} x 6.24 {15.8}
Aspect Ratio [width:height]		4:3
Pixel Number [1 pixel is RGB trio]		1,024 x 768
Colour		262k [6-bit each colour]
Grey Scale		256 [8-bit]
Backlight Luminance [CCFT type;	**minimum**	0
approx.; adjustable] (cdm^{-2}) [1]	**maximum**	1,700
Contrast Ratio [limiting; LCD]		300:1
Response Time [max.] (ms)		50
Readability [ambient conditions]		black-out to full direct sunlight [10^5 lux]
Night Vision Device compatible?		yes [low intensity green]
Viewing Angle	**vertical**	+40/-35
[full angle] (°)	**horizontal**	±55
Inputs		
Inputs		2 video and 1 PC [4 and 1 optional]
Signal Formats	**video**	PAL [all forms], NTSC [all forms], SECAM [all forms], CCIR-601, RS170; interlaced and non-interlaced
	PC	non-interlaced, 60Hz, RGB, separate Hsync. & Vsync., up to 1,024 x768 [standard PC XGA]

[1] 1 cdm^{-2} = 1 nit.

1.1 System Performance (cont'd)

PARAMETER		SPECIFICATION
Inputs (cont'd)		
Connection Formats	**video**	Composite, S-Video [Y-C]
	PC	RGB + Hsync. + Vsync.
Outputs		
Video		prime video input is output [what comes in goes out]
Safety & Protection		
Cooling		thermal transfer by internal and external convection; cooling fin fitted to rear
Backfill		purged & backfilled [N_2]
Display Window		Antireflection, hard-coated, sealed, EMI/EMC shielded
Altitude/Decompression		pressure relief valve, 2-way
Electrical Protection		conforms to QSTAG 307
Audible Emission [@ [3] 10m]		nil
Support		
MTBF (hours)		> 8,000
Operational Life (years)		10

1.2 Controls

Control Type	Location		Primary Label	Primary Function
Button	membrane on left of front face	top	⏻	toggle between active and standby
Button		2nd top	**1**	menu
Button		3rd top	**2**	show assigned screen lay-outs for selection
Button		middle	**3**	enhance
Button		3rd bottom	**4**	zoom
Button		2nd bottom	**5**	freeze
Button		bottom left	**-**	backlight down; scroll/adjust down
Button		bottom right	**+**	backlight up; scroll/adjust up

1.3 Communications

PARAMETER		SPECIFICATION
Ports		one Serial port [2]
Data	**Format**	RS232 [RS422 optional]
	Rate (Baud)	9,600 [1,200 to 230.6k optional; or to 10 Mbaud for RS422]

1.4 Physical Characteristics

PARAMETER			SPECIFICATION
Mass [approx.] (kg)			4.7
Dimensions	**Width**	**body**	281
(mm)		**overall** [3]	307
	Height	**body**	211
		overall [3]	229
	Depth [4]		96
Specific Gravity			>1 [non-floatation]
Mounting [5]			Dzus fasteners x 6 [type PFSC35] or or 2-way adjustable mounting bracket optional

1.5 Electrical Requirements

PARAMETER		SPECIFICATION
Supply Voltage (Vdc)		20 to 33 [28 nominal]
Current Drain	**heater on**	< 3
[@ 28Vdc; typical] (A)	**heater off**	< 2

[2] Shared with power input.
[3] Including mounting flange.
[4] Excluding connectors.
[5] Optional 2-way adjustable mounting bracket has four ¼" clearance holes for mounting

1.6 Environmental

PARAMETER			SPECIFICATION
Temperature (°C)	**Operate** [6]	**min.**	-25 [without wind-chill]
		max.	+55 [without solar radiation]
	Survive	**min.**	-30 [without wind-chill]
		max.	+71 [without solar radiation]
Vibration and Shock			MIL-STD-810E, aircraft [7]
Sealing [8]			water resistant [drip & spray]
EMI/EMC [8]			MIL-STD-461D [7]

1.7 Connector/Pin Details

No.	Name	Pin Marking	Purpose	Notes for Harness	Comment
A: VGA Input: Connector, MilSpec, Mil-C26482, Panel, Plug, Bayonet, 19 Way, 14 Shell, Pattern 105, square flange, AB05 2100 14-19P N00					
A1	**RED OUT**	A	N/A		
A2	**RED IN**	B	RED INPUT	coax (B,P), 75Ω	DB15 pin 1. Also Pr input for component video
A3	**GREEN OUT**	C	N/A		
A4	**GREEN IN**	D	GREEN INPUT	coax (D,R), 75Ω	DB15 pin 2. Also Y (and SOG) input for component video
A5	**BLUE OUT**	E	N/A		
A6	**BLUE IN**	F	BLUE INPUT	coax (F,S), 75Ω	DB15 pin 3. Also Pb input for component video
A7	**HS OUT**	G	N/A		
A8	**HS IN**	H	HSYNC INPUT	signal wire	DB15 pin 13
A9	**VS OUT**	J	N/A		
A10	**VS IN**	K	VSYNC INPUT	signal wire	DB15 pin 14
A11	**DDC_5V**	L	DDC CHANNEL +5V	unused	DB15 pin 9
A12	**DDC_SDA**	M	DDC CHANNEL DATA	unused	DB15 pin 12
A13	**DDC_SCL**	N	DDC CHANNEL CLOCK	unused	DB15 pin 15

[6] When used in accordance with procedures in User's Manual.
[7] Contact supplier for details.
[8] With compliant line connectors attached.

1.7 Connector/Pin Details (cont'd)

No.	Name	Pin Marking	Purpose	Notes for Harness	Comment
A: VGA Input (cont'd)					
A14	**RED GND**	P	RED coax GND	coax braid	DB15 pin 6
A15	**GREEN GND**	R	GREEN coax GND	coax braid	DB15 pin 7
A16	**BLUE GND**	S	BLUE coax GND	coax braid	DB15 pin 8
A17	**DIGITAL GND**	T	HSYNC GND	signal wire	DB15 pin 5
A18	**DIGITAL GND**	U	VSYNC GND	signal wire	DB15 pin 10
A19	**N/C**	V	UNUSED	unused	DB15 pin 4,11
B: Video Input: Connector, MilSpec, Mil-C26482, Panel, Socket, Bayonet, 19 Way, 14 Shell, Pattern 105, square flange, AB05 2100 14-19S N00					
B1	**Y1_GND**	A	Primary video (composite or luma) GND	coax, 75Ω shield	
B2	**Y1_SIGNAL**	B	Primary video (composite or luma) input	coax, 75Ω center	75Ω terminated in display
B3	**Y2_GND**	C	Secondary video (composite or Y) GND	coax, 75Ω shield	
B4	**Y2_SIGNAL**	D	Secondary video (composite or Y) input	coax, 75Ω center	75Ω terminated in display
B5	**RS485+**	E	RS485+ connection	signal	
B6	**RS485-**	F	RS485- connection	signal	
B7	**V-**	G	dc- (GND) connection	5A dc	internally isolated from comms and video GND.
B8	**V+**	H	Output power (+28V)	5A dc	Same as input dc
B9	**V+**	J	Output power (+28V)	5A dc	Same as input dc
B10	**VIDEO_OUT**	K	Switched video output	coax, 75Ω center	either Y1 or Y2 output, 75Ω double terminated
B11	**GND_OUT**	L	Video output GND	coax, 75Ω shield	
B12	**SPARE1**	M	Analogue input	signal	**SPARE1**
B13	**SPARE2**	N	Analogue input	signal	**SPARE2**
B14	**C1_SIGNAL**	P	Primary chroma input [or VCR composite input]	coax, 75Ω center	75Ω terminated in display
B15	**C2_SIGNAL**	R	Secondary chroma input	coax, 75Ω center	75Ω terminated in display

1.7 Connector/Pin Details (cont'd)

No.	Name	Pin Marking	Purpose	Notes for Harness	Comment
B: Video Input (cont'd)					
B16	**C_GND**	S	Chroma common [or VCR composite input]	coax, 75Ω shield	
B17	**V-**	T	dc- (GND) connection	5A dc	internally isolated from comms and video GND.
B18	**RS232_TX**	U	RS232 transmit (output from display)	signal	
B19	**RS232_RX**	V	RS232 receive (input to display)	signal	
C: dc Power Input & Comms Port Connection: Connector, MilSpec, Mil-C26482, Panel, Plug, Bayonet, 12 Way, 14 Shell, Pattern 105, square flange, AB05 2100 14-12P N00					
C1	**COMMS_GND**	A	common for comms	signal	
C2	**N/C**	B	unused		
C3	**RS232_RX**	C	RS232 receive (input to display)	signal	
C4	**RS232_TX**	D	RS232 transmit (output from display)	signal	
C5	**nRESET**	E	active low display reset control	reserved	
C6	**MODAB**	F	active low display bootload control	reserved	
C7	**RS485-**	G	RS485- connection	reserved	
C8	**RS485+**	H	RS485+ connection	reserved	
C9	**V-**	J	dc- (GND) connection	5A dc	internally isolated from comms and video GND.
C10	**V-**	K	dc- (GND) connection	5A dc	internally isolated from comms and video GND.
C11	**V+**	L	Input power (+28V) for display	5A dc	+20..+33V input
C12	**V+**	M	Input power (+28V) for display	5A dc	+20..+33V input

2 SET-UP

2.1 Mounts

The RMU has two optional mounting methods:

six type PFSC35 Dzus fasteners, located on the left and right (three per side) of the mounting flange; or

a 2-way adjustable mounting bracket fitted to the RMU.

In the case of the 2-way adjustable mounting bracket, four mounting points are provided, being ¼" diameter clearance holes located in the top section of the bracket.

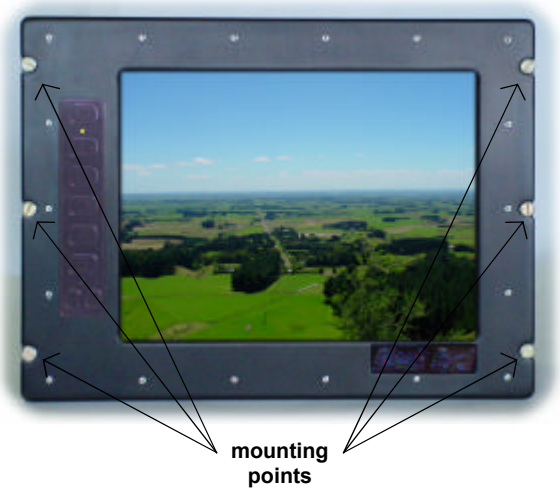

Figure 2-1: Mounts

2.2 Connections

The RMU has three connection points located on the rear of the unit:

Connector A, the VGA Input connector;

Connector B, the Video Input connector; and

Connector C, the dc Power Input & Comms Port connector.

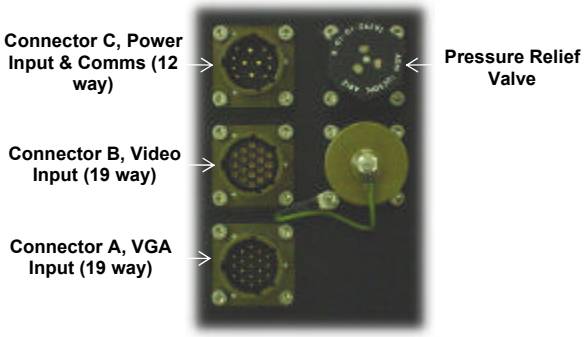

Figure 2-2: Connections

2.3 Set-up Procedure

CAUTION: **User-supplied cables must be correctly wired (see list of Connector/Pin Details).**

Ensure that external power is within the range specified herein.

Ensure that external power is OFF before proceeding with set-up.

- Mount the unit to the vehicle or platform, using the six Dzus fasteners provided.
- Connect the required video cable to Connector B and to the external imaging system(s).
- Connect the required VGA cable to Connector A and to the external VGA source.
- Connect the required power/data cable to Connector C and to the external power source, and to the communication data source (RS232).

2.4 Heating and Cooling

The unit contains internal heating and cooling mechanisms that are triggered at certain internal temperatures.

The operating procedures, internal temperatures and resulting operating conditions are shown in the following table.

Ambient Temp. (°C)	Procedure	Internal Temp. (°C)	Operating Condition
< -46	do not attempt to operate unit		
-46 to 0	de-ice unit prior to start-up	≤ 0	unit will not power up; heater on
		> 0	unit will power up; internal convection on
0 to +55	none	≥ 10	heater off
		≥ 55	backlight reduces
+55 to +60	provide forced air cooling (e.g. fan)		
> +60	do not attempt to operate unit	≥ 75	unit will not power up

The approximate warm-up rate is 17s/°C (e.g. with starting internal temperature of -46°C, unit will power up in about 13 minutes; with starting internal temperature of -25°C, unit will power up in about 7 minutes).

Once the unit has warmed it will operate normally provided that the ambient temperature stays within the specified operating temperature range. Otherwise the heater will remain on.